

was done. On the last day of the month there was a short flood in the upper waters of the Roanoke River, due to a heavy two-day rain, and considerable local damage resulted.

In the Southeastern States the water shortage became so acute as to necessitate the shutting down of many hydroelectric plants, and in some instances the overland hauling of water for steam purposes.

The daily forecasts of stages of water in the great rivers of the country have taken on an added importance by reason of the impetus recently given to river transportation through the extension of the barge service on the Mississippi and Ohio Rivers. On October 27, 1921, a fleet of 10 barges, carrying 8,000 tons of steel products, departed from Pittsburgh, Pa., for St. Louis, Mo., and extensions of the service north of St. Louis and further extensions south of Cairo, Ill., are planned for the near future.

The barges have a net tonnage of from 800 to 1,000 tons, and will probably have a draft of only 4 feet of water. The towboats will have about the same draft.

MEAN LAKE LEVELS DURING OCTOBER, 1921.

By UNITED STATES LAKE SURVEY.

[Detroit, Mich., Nov. 4, 1921.]

The following data are reported in the "Notice to Mariners" of the above date:

Date.	Lakes. ¹			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Above mean sea level at New York.....	<i>Feet.</i> 602.53	<i>Feet.</i> 579.86	<i>Feet.</i> 571.79	<i>Feet.</i> 245.11
Above or below—				
Mean stage of September, 1921.....	—0.14	—0.18	—0.38	—0.32
Mean stage of October, 1921.....	—0.15	—0.69	—0.26	—0.18
Average stage for October, last 10 years..	—0.16	—0.65	—0.39	—0.71
Highest recorded October stage.....	—1.03	—3.08	—1.91	—2.70
Lowest recorded October stage.....	+0.95	+0.26	+0.99	+1.44
Average relation of the October level to:				
September level.....		—0.20	—0.30	—0.40
November level.....		+0.20	+0.30	+0.20

¹ Lake St. Clair's level: In October, 574.65 feet.

EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS: OCTOBER, 1921.

By J. WARREN SMITH, Meteorologist.

The first half of October was cool for the season in the eastern half of the country, but for the month as a whole temperatures were above normal in nearly all sections. Some frost damage was done to tender vegetation during the first decade, and near the middle of the month killing frost occurred as far south as the northern portions of Oklahoma, Arkansas, and Tennessee, but a comparatively small amount of harm resulted, as crops were mostly mature. The month was unusually favorable for outdoor operations, except for some interruption from the upper Mississippi Valley eastward by rather frequent rainfall. From the 4th to the 25th fair weather prevailed throughout much the greater portion of the country.

The weather was more favorable for drying corn in the lower Missouri, central and upper Mississippi, and the Ohio Valley districts, and practically no damage was done by frost. Husking made satisfactory progress and, by the last decade of the month, this work was reported as well along in the Ohio Valley and about half done in Iowa. Much of the month was exceptionally favorable for drying the crop in good condition for cribbing.

Cotton bolls continued to open rapidly and the weather was very favorable for picking and ginning in all sections of the cotton belt. The rainfall early in the month was beneficial in checking deterioration in North Carolina, but little or no top crop was realized in any portion of the belt. Late cotton improved in portions of North Carolina and the yield was exceeding expectations in northern South Carolina; otherwise little or no improvement was reported in this crop during the month.

Less rain and more sunshine were favorable for seeding winter grains in the central and eastern portions of the winter-wheat belt, where frequent rains had previously caused considerable delay. Soil moisture conditions were satisfactory in the western portion of the belt during the early part of the month, but wheat in that area was unfavorably affected thereafter by dry weather, while it was generally too dry for seeding and germination from the Rocky Mountains westward and in many of the more eastern districts. The drought had become especially severe by the close of the month in the southwestern Great Plains, including most of western Kansas, and from Oklahoma and southeastern Colorado southward, where it was too dry for seeding and germination, and the wheat that was up showed steady deterioration.

Conditions were favorable for meadows, pastures, and late truck in the interior valley districts, but lack of moisture was harmful in most of the South, the Southwest, and many western localities. Frost did some damage to late truck in California the latter part of the month, while at the same time sugar cane was considerably damaged in parts of Florida by heavy rains and high winds.

The weather was generally favorable for fruit, except that heavy damage resulted to citrus fruit in parts of Florida from the tropical storm of the 25th and 26th. (See pp. 567-570 of this REVIEW.)